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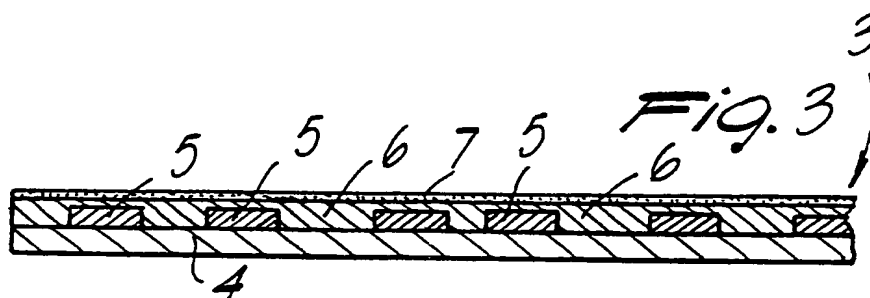
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㉖ Document with magnetically detectable anti-forgery means, and strip with magnetically detectable identification code and identification code.

㉗ The present invention relates to a document with magnetically detectable anti-forgery and/or anti-fraud means which has the peculiarity of comprising a plate-like element (2), embedding at least one strip (3) constituted by a layer of plastic or aluminum film. The strip (2) supports mutually spaced regions (5,10,20,23,30) obtained with a deposition of magnetic material. The regions (5,10,20,23,30) of magnetic material are readable with a magnetic reading head applicable externally to said plate-like element (2).

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# DOCUMENT WITH MAGNETICALLY DETECTABLE ANTI-FORGERY MEANS, AND STRIP WITH MAGNETICALLY DETECTABLE IDENTIFICATION CODE AND IDENTIFICATION CODE

The present invention relates to a document with magnetically detectable anti-forgery means, as well as to a strip with magnetically detectable identification code and to an identification code.

As is known, in banknotes and in other documents a strip is currently used, constituted by a polyester support, on which a layer of detectable metallic material is applied. This strip is currently embedded into the sheet constituting the banknote or document and the detection in practice is limited to establishing the presence or not of said element in the banknote or the like.

In practice the presence of the strip is not capable of providing any information which may allow a greater anti-forgery and/or anti-fraud assurance.

An identification or recognition code is furthermore known which is applied to documents, products, supports and the like, such as for example cheques, which is substantially constituted by spaced bars made with magnetic ink, so that it can be read by a magnetic reading head.

This system, which is commonly termed with the acronym CMC7, is not an anti-forgery element for the user, since it is used only for the automatic management of cheques, since such bars, being visible to the naked eye, may be easily modifiable with ordinary decoloring or abrasive erasure systems and replaceable with other bars so as to produce a forgery.

In practice, with the above described code it occurs that the reading head substantially detects the presence or not of the magnetic region and the width, in the readout direction, of said magnetic region, without being able to create a code which is not modifiable.

The aim proposed by the invention is to provide a document with anti-forgery and/or anti-fraud means which allows to have available a considerable number of items of information giving assurances as to the actual authenticity of the document.

Within the scope of the above described aim, a particular object of the invention is to provide a particular identification code which, besides the conventional combination of blank spaces and of magnetic regions, provides an extremely high number of pieces of information.

Still another object of the present invention is to provide an identification code which is not optically detectable, thus making all but impossible its fraudulent reproduction or its forgery.

A further object of the present invention is to provide a code which, being based on the com-

bination of a plurality of evaluation elements, allows to obtain a practically unlimited number of possible combinations, allowing, among other things, different alphabets in different codes, thus giving a great degree of security and non-reproducibility of the documents marked with said code.

Not least object of the present invention is to provide an identification code which does not require particular or in any way complicated techniques for its application to the document or product to which it is to be affixed.

The above described aim, as well as the objects mentioned and others which will become apparent hereinafter, are achieved by a document with magnetically detectable anti-forgery and/or anti-fraud means, according to the invention, characterized in that it comprises a plate-like element embedding at least one strip supporting mutually spaced regions obtained with a deposition of magnetic material, said regions of magnetic material being readable with a magnetic reading head applicable externally to said document.

Further characteristics and advantages of the invention will become apparent from the detailed description of a document with magnetically detectable anti-forgery and/or anti-fraud means, as well as to a strip with identification code embeddable in said document, which is illustrated in the accompanying drawings, wherein:

figure 1 is a schematic partially cutout view of a document according to the invention;

figure 2 is a schematic exploded view of the band from which said strips are obtainable;

figure 3 is a highly enlarged longitudinal cross section view of a strip;

figure 4 is a cross section view of a strip with regions of magnetic oxide with diversifiable intensity, obtained by varying the thickness of the layer of each region, applied thereto;

figure 5 is a schematic perspective view of a strip with the magnetic oxide regions and the indicative diagram of the detection by the magnetic reading head, pointing out the different amplitudes of the signal, according to the thickness of the layers;

figure 6 is a schematic view of a strip, before its masking, with regions of magnetic material with different intensity provided on both faces;

figure 7 is a cross section view of the strip according to figure 6, after the masking;

figure 8 is a schematic view of a band with regions of magnetic oxide with different intensity, obtained according to a different embodiment;

figure 9 is a schematic view of a strip obtained from the band according to figure 8;

figure 10 is a view of the masked strip preset for its introduction into a document.

With reference to the above described figures, and in particular to figures 1 to 3, the document with magnetically detectable anti-forgery and/or anti-fraud means, according to the invention, which is generally indicated by the reference numeral 1, comprises a plate-like element 2 which can be made with paper-like material or with any other material deemed suitable.

A strip, generally indicated by the reference numeral 3 and illustrated in figure 3, is embedded in the plate-like element and can be applied with the conventional techniques currently used in the application of metallic strips inside watermarked paper for banknotes.

The strip 3 is furthermore provided with a supporting layer 4 made of polyester, on at least one side whereof are deposited spaced magnetic regions 5, obtained by means of a deposition of magnetic iron-oxide.

Said regions 5 in practice constitute a bar code which extends for all or part of the length of the strip, offering the possibility of presetting on the strip all the information deemed suitable and which in practice render the forgery of said strip impossible.

In order to prevent the optical detection of the magnetic regions 5, a layer of paint 6 is applied which also has the function of preventing the fraudulent tampering or reproduction of said regions 5.

A layer of heat-melting adhesive material 7 is provided on one face or possibly on both faces of the strip 3 and has the function of integrally coupling the strip 3 to the interior of the plate-like element which embeds it.

The strip 3, in the practical embodiment, has a width which is extremely reduced and can be of the order of a millimeter or even smaller.

In this manner it is possible to have considerable information available, encoded in any way and easily and rapidly detectable and readable by means of a magnetic reading head which analyzes the document.

The strip as illustrated in figure 2 is advantageously obtained starting from a band 9 having great width on which the regions 5 are preset with magnetic oxide deposition, so as to have a possibly industrializable production.

The individual strips 3 are then simply obtained by means of a mechanical cut along the longitudinal direction which separates the band 9 into a plurality of separate strips 3.

In order to further increase the characteristics of anti-forgery security, it is possible to apply a

more complicated magnetically detectable code to the strip, so as to provide greater information and to make forgery practically impossible.

Said code, as schematically illustrated in figures 4 and 5, has regions, generally indicated by 10, which are mutually spaced by blank clearings 11 and which have a diversifiable magnetic intensity. In the example illustrated in figure 4 and 5 the diversification of magnetic intensity is obtained by varying in practice the thickness of the layer of magnetic oxide which constitutes each region 10.

Substantially, by applying a thickness of magnetic oxide which is variable in the direction perpendicular to the support, in practice the intensity of the detectable magnetic field is varied, so that the reading head, besides being capable of emitting a signal which is a function of the width of the region 10, in the direction of reading, as well as of the width of any blank spaces 11, emits a signal the amplitude whereof is variable as a function of the thickness of the layer.

In practice a new method is introduced, not currently used in the magnetic reading of alphanumeric codes, which is combinable with the other known ones, so as to allow to obtain, the number of elements being equal, a number of combinations effectable with codes of the bar type or of any other type, considerably greater than that normally obtainable.

Advantageously, the thicknesses of the layer may be multiples of one another, so as to clearly diversify the reading regions in terms of amplitude; thus allowing the considerable extension of the range of combinations.

Another important advantage, which derives from the use of mutually diversifiable layer thicknesses, resides in the fact that the different thicknesses are not optically detectable, since also in this case a layer of covering paint, again indicated by 6, is applied together with one or two layers of heat-melting adhesive material, again indicated by 7.

As illustrated in figure 5, a readout diagram of the emittable signal is obtained wherein it is possible to easily identify the various levels of the amplitudes of the signal which depend upon the thickness of the layer; as previously mentioned, in order to facilitate the readout it is possible to use mutually multiple layer thicknesses, so as to avoid possible doubts in interpreting the readout of the emitted signal.

In order to further increase the signal range obtainable, without introducing productive difficulties in the diversification of the thicknesses of layers, it is possible, as illustrated in figures 6 and 7, to apply the magnetic regions both on the face 4a and on the opposite face 4b of the strip polyester support 4.

In practice on the first face 4a a plurality of first regions indicated by 20 is provided, constituted by a layer of magnetic oxide having diversifiable magnetic intensity, which are mutually spaced by first blank regions 21, that is to say by regions in which a layer of magnetic oxide is not provided.

On the other face 4b second regions 23 are provided, also constituted by a layer of magnetic oxide having diversifiable magnetic intensity, spaced by regions 24.

The presence of magnetic oxide or in any case magnetically detectable regions with diversifiable intensity on both the faces of the support 4 leads to considerable advantages, since it allows to significantly increase the number of combinations which are detectable by the magnetic reading head.

In fact, by virtue of the interposition of the support layer, the reading which the magnetic head performs, besides generating a signal the duration whereof is a function of the width of the region in the reading direction and of the blank spaces interposed therebetween, has an amplitude which is a function of the magnetic intensity of the region, as well as of the face of the support on which the magnetic layer region is applied, since the interposition of the support layer creates a variation of distance from the reading head and consequently a variation of the intensity of the detectable magnetic field.

This type of variation provides values of magnetic intensity which are "intermediate" since, the thickness or density of the layer being equal, the signal which is detected is variable depending on the face on which the region is applied, without thereby causing applicative difficulties to obtain said variations of magnetic intensity between the individual regions.

Also in this case a layer of covering paint is applied, again indicated by 6, and so is a layer of heat-melting adhesive 7, which in practice integrally couples the strip once it is introduced into the thickness of the paper or in any case in the material of which the document, product or the like is made, on which the identification code according to the invention is applied.

The variation of the magnetic intensity of the individual regions, besides by varying the thickness of the layer of magnetic oxide as illustrated in figures 4 to 7, can be obtained by varying the density of the magnetic field of the layer, as indicated in figures 8 to 10.

More in detail, the regions, now indicated by 30, are again provided by bars which are spaced, as in the previous cases, by blank spaces 31 and which, advantageously, can all have the same width in the readout direction, said direction being usually the one perpendicular to the longitudinal

extension of the bars.

The regions or bars 30 are constituted by a magnetic oxide layer having the peculiarity of having an amount of magnetic oxide diversifiable from bar to bar. This diversification is obtained by making each of the regions 30 with bands 35 of magnetic oxide interleaved with blank bands 36 in which it is possible to vary the ratio between blank band 36 and magnetic band 35, so as to practically vary the amount of magnetic oxide provided in each strip.

Three different levels of amount of magnetic oxide are advantageously provided in each region, said levels being preferably, but not necessarily, also in this case multiples of one another, so as to facilitate readout by means of a sharp diversification among the various regions 30.

The bands 35 and 36 are advantageously at an angle relatively to the longitudinal extension of the individual region, so as to have a uniform reading in terms of the amplitude of the signal, as will become apparent hereinafter, in the reading region of the magnetic reading head, which moves on the code in a perpendicular direction with respect to the extension of the strips.

The provision of the angled bands inclined allows, within the reading region set by the head, the amount of detectable magnetic oxide to be practically constant, not being excessively influenced by the alternation of the bands, since in practice an average reading is performed which takes into account the amount of magnetic oxide present on the average.

The reading head, as in the preceding cases, generates a signal the duration whereof is a function of the width of the individual regions 30 and of the blank spaces 31, in the readout direction, and the amplitude whereof derives directly from the amount of magnetic oxide which is provided in each of said regions, said amount depending on the ratio between the bands of magnetic oxide and the blank bands.

At this point it must be noted that from a conceptual point of view it is theoretically possible to obtain the variation of amount of magnetic oxide for each region by varying in practice the density of magnetic oxide provided in the printing ink employed, this however from a practical and productive point of view creates the disadvantage of having to execute, for the application of the code, various successive print steps, with inks having different magnetic oxide density, with the severe problem of executing precisely aligned passes.

As is schematically illustrated in the drawing, also in this case the code is applied to a support layer, constituted by a polyester or possibly aluminum film which has the masking layers 6 and the heat-meltable layer 7.

According to a preferred but naturally non-limitative embodiment, a magnetic ink is used, containing ferromagnetic ferrite and having a solid content of approximately 30% and a viscosity in use assessable at approximately 25 seconds with FORD no. 4 cup.

The thickness of the support and of any covering layers as described above, has a final value assessable at approximately 40 microns.

From what has been described above it can thus be seen that the invention achieves the intended aims and in particular the fact is stressed that the provision of a document in which a strip is insertable having a magnetic code, which in turn can employ, besides the presence or absence of magnetic regions, also the different magnetic intensity of each region, provides a document with a customizable code, since it is possible to have an extremely wide range of alphabets, which can be reserved to each single user, with consequently increased assurance of reliability.

Furthermore the magnetic bar code is applicable with conventional rotogravure or offset printing, which allows to obtain regions with different amounts of magnetic oxide, which thus cause a different response signal, in terms of its amplitude, with the consequent advantage of a considerable increase in the range of obtainable combinations.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

Moreover all the details may be replaced with other technically equivalent elements.

In practice, the materials employed, so long as compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

1. Document with magnetically detectable anti-forgery means, characterized in that it comprises a plate-like element (2) embedding at least one strip (3) supporting mutually spaced regions (5,10,20,23,30) obtained with a deposition of magnetic material, said regions (5,10,20,23,30) of magnetic material being readable with a magnetic reading head applicable externally to said plate-like element (2).

2. Document, according to claim 1, characterized in that said magnetic material is constituted by magnetic iron oxide.

3. Document, according to the preceding claims, characterized in that said regions (5,10,20,23,30) of magnetic material are shaped like a bar and spaced by blank spaces (11,21,24,31).

4. Document, according to one or more of the preceding claims, characterized in that said regions (10,20,23,30) of magnetic material have diversifiable magnetic intensity.

5. Document, according to one or more of the preceding claims, characterized in that it comprises said regions (20,23) of magnetic material on both faces of said strip (2).

6. Document, according to one or more of the preceding claims, characterized in that it comprises a masking layer (6) applicable on said regions (5) to hide said regions from view.

7. Document, according to one or more of the preceding claims, characterized in that it comprises on at least one face of said strip (2) a layer (7) of heat-melting adhesive material.

8. Strip with magnetically detectable identification code, characterized in that it comprises a supporting layer (4) on at least one face (4a,4b) whereof are provided regions (5,10,20,23) of mutually spaced magnetic material, said regions (5,10,20,23) of magnetic material being readable with a magnetic reading head applicable proximate to said strip (3).

9. Strip according to the preceding claim, characterized in that it comprises a masking layer (6) applied at least on the portion affected by said regions (5,10,20,23) to hide from sight said regions (5,10,20,23) of magnetic material.

10. Strip according to one or more of the preceding claims, characterized in that said regions (10,20,23,30) of magnetic material have diversifiable magnetic intensity.

11. Strip according to one or more of the preceding claims, characterized in that said regions (10,20,23) with diversifiable magnetic intensity have a thickness of the magnetic layer diversifiable in the direction substantially perpendicular to the plane of arrangement of the supporting element (4).

12. Strip according to one or more of the preceding claims, characterized in that said regions (30) with diversifiable magnetic intensity are constituted by bands (35) of magnetic oxide spaced with blank bands (36), to vary the amount of magnetic oxide of the region (30) by varying the ratio between said bands (35) with magnetic oxide and said blank bands (36).

13. Strip according to one or more of the preceding claims, characterized in that it comprises on at least one face a layer (7) of heat-melting adhesive material.

14. Magnetically identifiable identification code 5  
for marking products, documents and the like, characterized in that it comprises regions (5,10,20,23,30) with diversifiable magnetic intensity mutually spaced by spaces (11,21,24,31), said regions (5,10,20,23,30) being detectable by a mag- 10  
netic reading head generating a signal the duration whereof is a function of the width of said regions (5,10,20,23,30) and of said blank spaces (11,21,24,31), in the reading direction, and the am- 15  
plitude whereof is a function of the intensity of magnetic field generated by each of said regions (5,10,20,23,30).

15. Code, according to the preceding claim, characterized in that said regions with diversifiable magnetic intensity are constituted by a layer 20  
(10,20,23) of magnetic oxide having diversifiable layer thickness in the direction perpendicular to the plane of arrangement of the supporting element (4) of said regions (10,20,23).

16. Code, according to one or more of the 25  
preceding claims, characterized in that said magnetic oxide layer thicknesses (10,20,23) are multiples of one another.

17. Code, according to one or more of the 30  
preceding claims, characterized in that said regions (30) with diversifiable magnetic intensity are constituted by bands (35) of magnetic oxide spaced by blank bands (36), to vary the amount of magnetic oxide of each region, varying the ratio between 35  
said bands (35) with magnetic oxide and said blank bands (36).

18. Code, according to one or more of the 40  
preceding claims, characterized in that said bands (35,36) extend along a direction inclined with respect to the extension of said regions (30).

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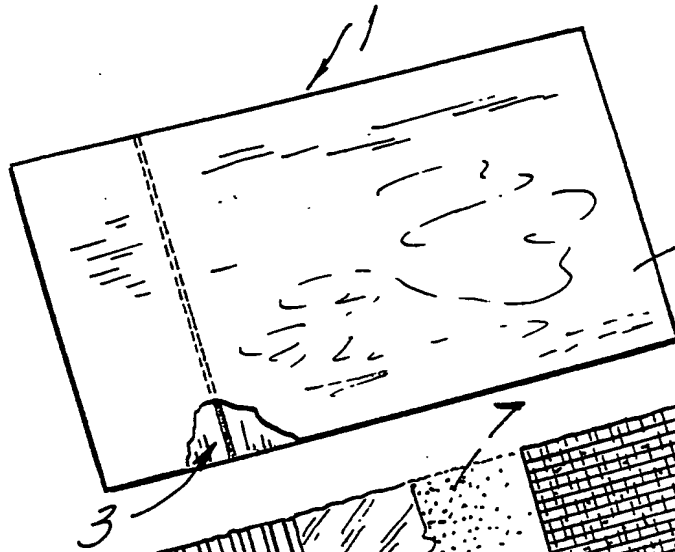


Fig. 1

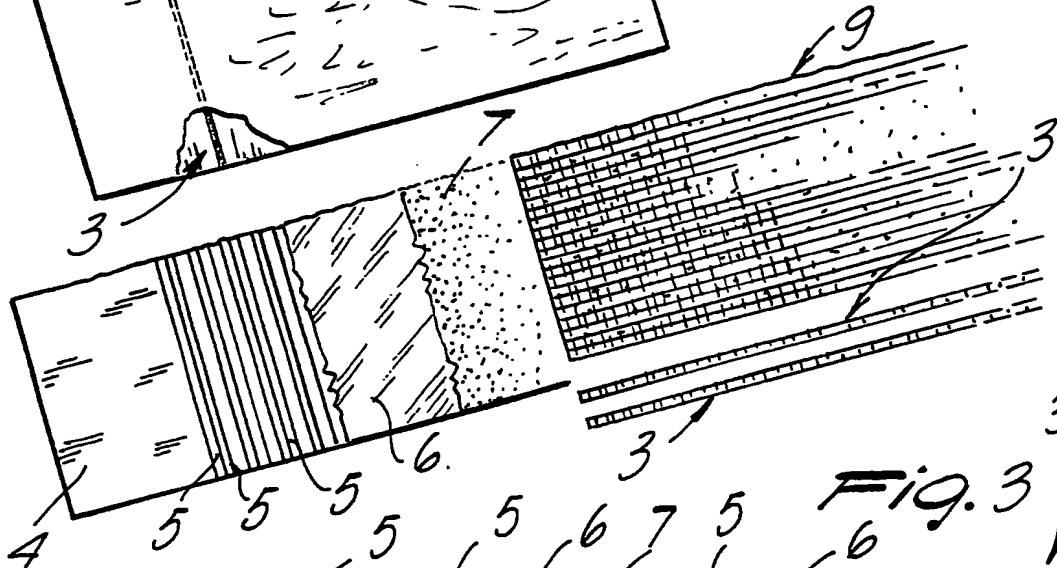


Fig. 2

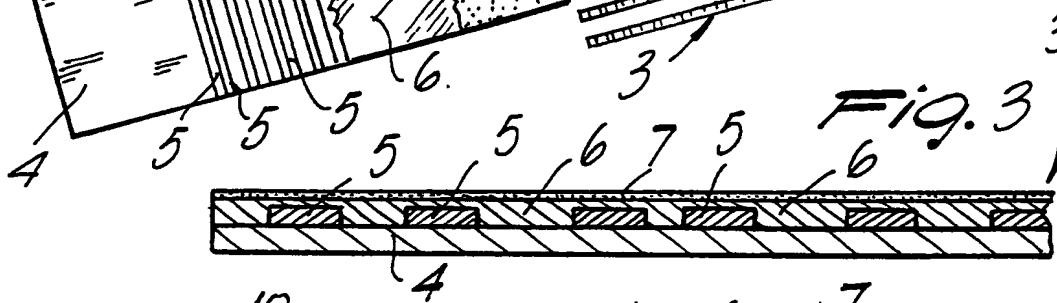


Fig. 3

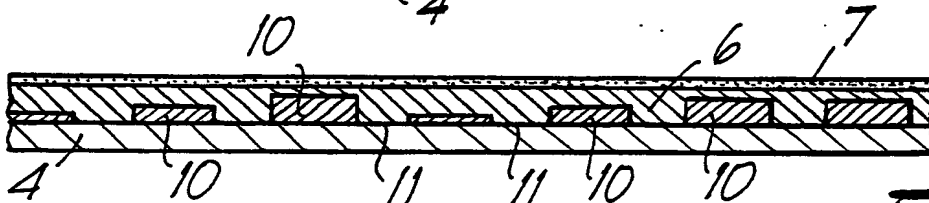


Fig. 4

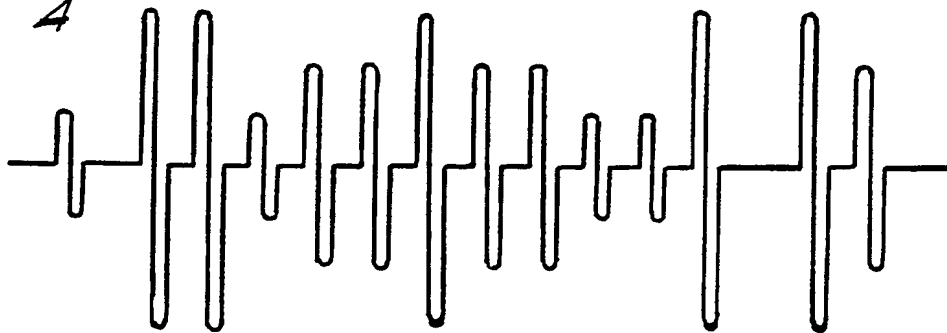


Fig. 5

